BLAST Basic Local Alignment Search Tool

Job Title: lcl|31840 (21 letters) USSN 10/738,413 EXHIBIT 5

- Your search parameters were adjusted to search for a short input sequence.

Please, try our new design!

BLASTN 2.2.18+

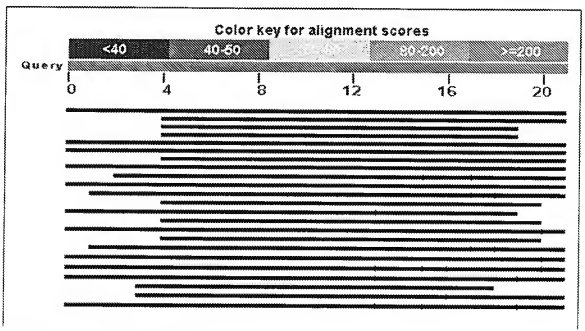
Reference: Stephen F. Altschul, Thomas L. Madden, Alejandro A. Schäffer, Jinghui Zhang, Zheng Zhang, Webb Miller, and David J. Lipman (1997), "Gapped BLAST and PSI-BLAST: a new generation of protein database search programs", Nucleic Acids Res. 25:3389-3402. RID: 9H5H90R0015 **Database:** human build 36.3 reference assembly genomic scaffolds 49,942 sequences; 5,818,011,736 total letters

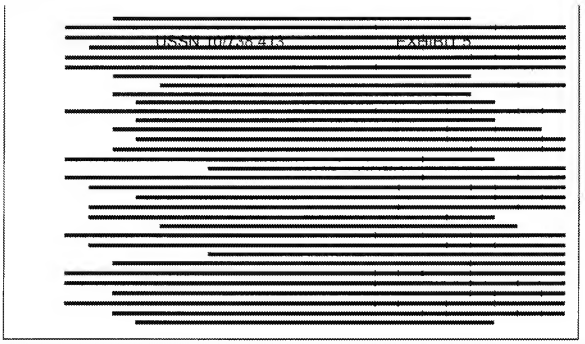
Genome View — Show positions of the BLAST hits in the human genome using the Entrez Genomes MapViewer

Query= Length=21

Designing or Testing PCR Primers? Try your s

Distribution of 654 Blast Hits on the Query Sequence




USSN 10/758,413
EXHIBIT 5

NEW

USSN 10/738,413 EXHIBIT 5

Legend for links to other resources: UniGene GEO Gene Structure Map

Sequences producing significant alignments:
(Click headers to sort columns)

Transcripts

gi|113722118|NM_000372.4	Homo sapiens tyrosinase (oculocutaneous albinism IA) (TYR), mRNA	42.1	42.1	100%	0.005	100%
gi|32313592|NM_006418.3	Homo sapiens olfactomedin 4 (OLFM4), mRNA	34.2	34.2	80%	1.2	100%
gi|149363684|NM_015325.1	Homo sapiens KIAA0947 protein (KIAA0947), mRNA	30.2	30.2	71%	19	100%
gi|142386366|NM_138392.2	Homo sapiens SH3KBP1 binding protein 1 (SHKBP1), mRNA	30.2	30.2	71%	19	100%

Genomic sequences [show first]

gi|157812179|NW_001838029.2	Homo sapiens chromosome 11 genomic contig, alternate assembly (based on HuRef SCAF_1103279185367)	42.1	42.1	100%	0.005	100%
gi|51470779|NT_008984.17	Homo sapiens chromosome 11 genomic contig, reference assembly	42.1	42.1	100%	0.005	100%
gi|157812202|NW_001838080.2	Homo sapiens chromosome 13 genomic contig, alternate assembly (based on HuRef SCAF_1103279188250)	34.2	62.4	80%	1.2	100%
gi|157697950|NW_001842360.1	Homo sapiens chromosome X genomic contig, alternate assembly (based on HuRef SCAF_1103279188416)	34.2	222	100%	1.2	100%
gi|37546841|NT_024524.13	Homo sapiens chromosome 13 genomic contig, reference assembly	34.2	413	90%	1.2	100%
gi|89059526|NT_011757.15	Homo sapiens chromosome X genomic contig, reference assembly	34.2	276	100%	1.2	100%
gi|157696942|NW_001838065.1	Homo sapiens chromosome 12 genomic contig, alternate assembly (based on HuRef SCAF_1103279188103)	32.2	84.7	95%	4.7	100%
gi|157811946|NW_001838849.2	Homo sapiens chromosome 2 genomic contig, alternate assembly (based on HuRef SCAF_1103279188271)	32.2	58.5	76%	4.7	100%
gi|157697620|NW_001838401.1	Homo sapiens chromosome 16 genomic contig, alternate assembly (based on HuRef SCAF_1103279187672)	32.2	58.5	90%	4.7	100%
gi|157696568|NW_001839007.1	Homo sapiens chromosome 7 genomic contig, alternate assembly (based on HuRef SCAF_1103279185597)	32.2	58.5	76%	4.7	100%
gi|157696481|NW_001838920.1	Homo sapiens chromosome 4	32.2	84.7	100%	4.7	100%

USSN 10/738,448 EXHIBIT 5

	genomic contig, alternate assembly (based on HuRef SCAF_1103279188283)					
gi|37538184|NT_033968.5	Homo sapiens chromosome 7 genomic contig, reference assembly	32.2	58.5	76%	4.7	100%
gi|89035805|NT_009755.18	Homo sapiens chromosome 12 genomic contig, reference assembly	32.2	252	95%	4.7	100%
gi|88977422|NT_016354.18	Homo sapiens chromosome 4 genomic contig, reference assembly	32.2	403	100%	4.7	100%
gi|88953723|NT_022135.15	Homo sapiens chromosome 2 genomic contig, reference assembly	32.2	220	100%	4.7	100%
gi|51472974|NT_010393.15	Homo sapiens chromosome 16 genomic contig, reference assembly	32.2	428	100%	4.7	100%
gi|157812194|NW_001838066.2	Homo sapiens chromosome 12 genomic contig, alternate assembly (based on HuRef SCAF_1103279188213)	30.2	30.2	71%	19	100%
gi|157812193|NW_001838064.2	Homo sapiens chromosome 12 genomic contig, alternate assembly (based on HuRef SCAF_1103279188390)	30.2	111	85%	19	100%
gi|157812275|NW_001838218.2	Homo sapiens chromosome 15 genomic contig, alternate assembly (based on HuRef SCAF_1103279188258)	30.2	351	100%	19	100%
gi|157812414|NW_001838483.2	Homo sapiens chromosome 19 genomic contig, alternate assembly (based on HuRef SCAF_1103279188176)	30.2	30.2	71%	19	100%
gi|157812175|NW_001838022.2	Homo sapiens chromosome 11 genomic contig, alternate assembly (based on HuRef SCAF_1103279188392)	30.2	399	100%	19	100%
gi|157697854|NW_001838666.1	Homo sapiens chromosome 20 genomic contig, alternate assembly (based on HuRef SCAF_1103279188360)	30.2	58.5	100%	19	100%
gi|157811963|NW_001838884.2	Homo sapiens chromosome 3 genomic contig, alternate assembly (based on HuRef SCAF_1103279188385)	30.2	508	95%	19	100%
gi|157697894|NW_001838706.1	Homo sapiens chromosome 21 genomic contig, alternate assembly (based on HuRef SCAF_1103279188379)	30.2	244	100%	19	100%
gi|157811817|NW_001838533.2	Homo sapiens chromosome 1 genomic contig, alternate assembly (based on HuRef SCAF_1103279188157)	30.2	375	100%	19	100%
gi|157812405|NW_001838466.2	Homo sapiens chromosome 18 genomic contig, alternate assembly (based on HuRef SCAF_1103279188324)	30.2	30.2	71%	19	100%
gi|157812170|NW_001838005.2	Homo sapiens chromosome 10 genomic contig, alternate assembly (based on HuRef	30.2	56.5	80%	19	100%

USSN 10/738,413 EXHIBIT 5

	SCAF_1103279188123)					
gi|157697891|NW_001838703.1	Homo sapiens chromosome 21 genomic contig, alternate assembly (based on HuRef SCAF_1103279188184)	30.2	30.2	71%	19	100%
gi|157696803|NW_001839242.1	Homo sapiens chromosome 9 genomic contig, alternate assembly (based on HuRef SCAF_1103279188125)	30.2	30.2	71%	19	100%
gi|157697933|NW_001838745.1	Homo sapiens chromosome 22 genomic contig, alternate assembly (based on HuRef SCAF_1103279188372)	30.2	325	100%	19	100%
gi|157812071|NW_001839109.2	Homo sapiens chromosome 8 genomic contig, alternate assembly (based on HuRef SCAF_1103279182719)	30.2	30.2	71%	19	100%
gi|157812219|NW_001838113.2	Homo sapiens chromosome 14 genomic contig, alternate assembly (based on HuRef SCAF_1103279188183)	30.2	139	85%	19	100%
gi|157811769|NW_001838589.2	Homo sapiens chromosome 1 genomic contig, alternate assembly (based on HuRef SCAF_1103279188310)	30.2	161	85%	19	100%
gi|157696564|NW_001839003.1	Homo sapiens chromosome 7 genomic contig, alternate assembly (based on HuRef SCAF_1103279188377)	30.2	294	90%	19	100%
gi|157697730|NW_001838329.1	Homo sapiens chromosome 16 genomic contig, alternate assembly (based on HuRef SCAF_1103279188231)	30.2	82.8	85%	19	100%
gi|157696323|NW_001838762.1	Homo sapiens chromosome 2 genomic contig, alternate assembly (based on HuRef SCAF_1103279187945)	30.2	30.2	71%	19	100%
gi|157812368|NW_001838328.2	Homo sapiens chromosome 16 genomic contig, alternate assembly (based on HuRef SCAF_1103279187671)	30.2	167	100%	19	100%
gi|157811893|NW_001838818.2	Homo sapiens chromosome 2 genomic contig, alternate assembly (based on HuRef SCAF_1103279188423)	30.2	222	95%	19	100%
gi|157812178|NW_001838028.2	Homo sapiens chromosome 11 genomic contig, alternate assembly (based on HuRef SCAF_1103279187758)	30.2	82.8	85%	19	100%
gi|157696534|NW_001838973.1	Homo sapiens chromosome 6 genomic contig, alternate assembly (based on HuRef SCAF_1103279188126)	30.2	193	95%	19	100%
gi|157696439|NW_001838878.1	Homo sapiens chromosome 3 genomic contig, alternate assembly (based on HuRef SCAF_1103279188187)	30.2	56.5	80%	19	100%
gi|157696487|NW_001838926.1	Homo sapiens chromosome 5 genomic contig, alternate assembly (based on HuRef SCAF_1103279187504)	30.2	30.2	71%	19	100%
gi|157811959|NW_001838877.2		30.2	399	100%	19	100%

USSN 10/788,413 EXHIBIT 5

	Homo sapiens chromosome 3 genomic contig, alternate assembly (based on HuRef SCAF_1103279188143)					
gi|157697822|NW_001838484.1	Homo sapiens chromosome 19 genomic contig, alternate assembly (based on HuRef SCAF_1103279188355)	30.2	214	95%	19	100%
gi|157696988|NW_001838110.1	Homo sapiens chromosome 14 genomic contig, alternate assembly (based on HuRef SCAF_1103279188393A)	30.2	82.8	71%	19	100%
gi|157696904|NW_001838027.1	Homo sapiens chromosome 11 genomic contig, alternate assembly (based on HuRef SCAF_1103279184614)	30.2	56.5	90%	19	100%
gi|51464027|NT_022517.17	Homo sapiens chromosome 3 genomic contig, reference assembly	30.2	480	100%	19	100%
gi|51465675|NT_007592.14	Homo sapiens chromosome 6 genomic contig, reference assembly	30.2	434	100%	19	100%
gi|51468880|NT_033927.7	Homo sapiens chromosome 11 genomic contig, reference assembly	30.2	112	90%	19	100%
gi|51493278|NT_026437.11	Homo sapiens chromosome 14 genomic contig, reference assembly	30.2	327	100%	19	100%
gi|51464897|NT_006576.15	Homo sapiens chromosome 5 genomic contig, reference assembly	30.2	351	90%	19	100%
gi|51467290|NT_035014.4	Homo sapiens chromosome 9 genomic contig, reference assembly	30.2	30.2	71%	19	100%
gi|88953465|NT_022171.14	Homo sapiens chromosome 2 genomic contig, reference assembly	30.2	222	95%	19	100%
gi|89061340|NT_011903.12	Homo sapiens chromosome Y genomic contig, reference assembly	30.2	135	85%	19	100%
gi|88966845|NT_005612.15	Homo sapiens chromosome 3 genomic contig, reference assembly	30.2	668	100%	19	100%
gi|51463895|NT_022459.14	Homo sapiens chromosome 3 genomic contig, reference assembly	30.2	84.7	80%	19	100%
gi|29801560|NT_011295.10	Homo sapiens chromosome 19 genomic contig, reference assembly	30.2	244	95%	19	100%
gi|51473102|NT_010498.15	Homo sapiens chromosome 16 genomic contig, reference assembly	30.2	432	100%	19	100%
gi|88943682|NT_004487.18	Homo sapiens chromosome 1 genomic contig, reference assembly	30.2	454	100%	19	100%
gi|37552484|NT_023736.16	Homo sapiens chromosome 8 genomic contig, reference assembly	30.2	56.5	85%	19	100%
gi|51470970|NT_009237.17	Homo sapiens chromosome 11 genomic contig, reference	30.2	478	100%	19	100%

USSN 10/738,413 EXHIBIT 5

	assembly					
gi|89024890|NT_007819.16	Homo sapiens chromosome 7 genomic contig, reference assembly	30.2	340	95%	19	100%
gi|88952973|NT_022221.12	Homo sapiens chromosome 2 genomic contig, reference assembly	30.2	56.5	80%	19	100%
gi|89059027|NT_011520.11	Homo sapiens chromosome 22 genomic contig, reference assembly	30.2	482	100%	19	100%
gi|37540936|NT_010194.16	Homo sapiens chromosome 15 genomic contig, reference assembly	30.2	432	100%	19	100%
gi|51475294|NT_011512.10	Homo sapiens chromosome 21 genomic contig, reference assembly	30.2	274	100%	19	100%
gi|88942921|NT_032977.8	Homo sapiens chromosome 1 genomic contig, reference assembly	30.2	587	100%	19	100%
gi|51475129|NT_011362.9	Homo sapiens chromosome 20 genomic contig, reference assembly	30.2	137	100%	19	100%
gi|51493354|NT_010859.14	Homo sapiens chromosome 18 genomic contig, reference assembly	30.2	191	90%	19	100%
gi|51467897|NT_030059.12	Homo sapiens chromosome 10 genomic contig, reference assembly	30.2	456	95%	19	100%
gi|157698021|NW_001842414.1	Homo sapiens chromosome X genomic contig, alternate assembly (based on HuRef SCAF_1103279186251)	28.2	54.5	80%	73	100%
gi|157697797|NW_001838459.1	Homo sapiens chromosome 17 genomic contig, alternate assembly (based on HuRef SCAF_1103279188101)	28.2	28.2	66%	73	100%
gi|157697690|NW_001838289.1	Homo sapiens chromosome 16 genomic contig, alternate assembly (based on HuRef SCAF_110327918840GA)	28.2	28.2	66%	73	100%
gi|157696440|NW_001838879.1	Homo sapiens chromosome 3 genomic contig, alternate assembly (based on HuRef SCAF_1103279181846)	28.2	28.2	66%	73	100%
gi|157696476|NW_001838915.1	Homo sapiens chromosome 4 genomic contig, alternate assembly (based on HuRef SCAF_1103279188399)	28.2	135	71%	73	100%
gi|157812004|NW_001838981.2	Homo sapiens chromosome 6 genomic contig, alternate assembly (based on HuRef SCAF_1103279188350)	28.2	133	85%	73	100%
gi|157812509|NW_001842412.2	Homo sapiens chromosome X genomic contig, alternate assembly (based on HuRef SCAF_1103279188343)	28.2	80.8	95%	73	100%
gi|157812198|NW_001838073.2	Homo sapiens chromosome 13 genomic contig, alternate assembly (based on HuRef SCAF_1103279188117)	28.2	54.5	66%	73	100%
gi|157697796|NW_001838458.1		28.2	54.5	76%	73	100%

USSN 10/738,413 EXHIBIT 5

	Homo sapiens chromosome 17 genomic contig, alternate assembly (based on HuRef SCAF_1103279188205)	
gi|157696179|NW_001838523.1	Homo sapiens chromosome 1 genomic contig, alternate assembly (based on HuRef SCAF_1103279188240)	28.2 54.5 85% 73 100%
gi|157697949|NW_001842359.1	Homo sapiens chromosome X genomic contig, alternate assembly (based on HuRef SCAF_1103279188171A)	28.2 28.2 66% 73 100%
gi|157811991|NW_001838953.2	Homo sapiens chromosome 5 genomic contig, alternate assembly (based on HuRef SCAF_1103279188146)	28.2 159 90% 73 100%
gi|157696949|NW_001838072.1	Homo sapiens chromosome 13 genomic contig, alternate assembly (based on HuRef SCAF_1103279184538)	28.2 28.2 66% 73 100%
gi|157697497|NW_001838219.1	Homo sapiens chromosome 15 genomic contig, alternate assembly (based on HuRef SCAF_1103279188391)	28.2 28.2 66% 73 100%
gi|157811954|NW_001838865.2	Homo sapiens chromosome 2 genomic contig, alternate assembly (based on HuRef SCAF_1103279188138)	28.2 54.5 85% 73 100%
gi|157811766|NW_001838579.2	Homo sapiens chromosome 1 genomic contig, alternate assembly (based on HuRef SCAF_1103279188432)	28.2 212 100% 73 100%
gi|88998470|NT_025741.14	Homo sapiens chromosome 6 genomic contig, reference assembly	28.2 430 100% 73 100%
gi|88972123|NT_037622.5	Homo sapiens chromosome 4 genomic contig, reference assembly	28.2 54.5 66% 73 100%
gi|51464299|NT_022778.15	Homo sapiens chromosome 4 genomic contig, reference assembly	28.2 28.2 66% 73 100%
gi|89060463|NT_011726.13	Homo sapiens chromosome X genomic contig, reference assembly	28.2 80.8 100% 73 100%
gi|51466650|NT_007914.14	Homo sapiens chromosome 7 genomic contig, reference assembly	28.2 139 95% 73 100%
gi|37552371|NT_011255.14	Homo sapiens chromosome 19 genomic contig, reference assembly	28.2 133 80% 73 100%
gi|89059032|NT_011521.4	Homo sapiens chromosome 22 genomic contig, reference assembly	28.2 28.2 66% 73 100%
gi|37551285|NT_034880.3	Homo sapiens chromosome 6 genomic contig, reference assembly	28.2 109 85% 73 100%
gi|88954065|NT_005403.16	Homo sapiens chromosome 2 genomic contig, reference assembly	28.2 454 100% 73 100%

USSN 10/738,413 EXHIBIT 5

Designing or Testing PCR Primers? Try your s

Alignments

>gi|113722118|ref|NM_000372.4| UniGene Homo sapiens tyrosinase (oculocutaneous albinis
Length=2082

GENE ID: 7299 TYR | tyrosinase (oculocutaneous albinism IA) [Homo sapiens]
(Over 100 PubMed links)

Score = 42.1 bits (21), Expect = 0.005
Identities = 21/21 (100%), Gaps = 0/21 (0%)
Strand=Plus/Plus

```
Query  1    AATAGGACCTGCCAGTGCTCT  21
            |||||||||||||||||||||
Sbjct  338  AATAGGACCTGCCAGTGCTCT  358
```

>gi|32313592|ref|NM_006418.3| UniGene Homo sapiens olfactomedin 4 (OLFM4), mRNA
Length=2844

GENE ID: 10562 OLFM4 | olfactomedin 4 [Homo sapiens] (10 or fewer PubMed links)

Score = 34.2 bits (17), Expect = 1.2
Identities = 17/17 (100%), Gaps = 0/17 (0%)
Strand=Plus/Plus

```
Query  5    GGACCTGCCAGTGCTCT  21
            |||||||||||||||||
Sbjct  242  GGACCTGCCAGTGCTCT  258
```

>gi|149363684|ref|NM_015325.1| UniGene Homo sapiens KIAA0947 protein (KIAA0947), mRNA
Length=7966

GENE ID: 23379 KIAA0947 | KIAA0947 protein [Homo sapiens]
(10 or fewer PubMed links)

Score = 30.2 bits (15), Expect = 19
Identities = 15/15 (100%), Gaps = 0/15 (0%)
Strand=Plus/Plus

```
Query  5     GGACCTGCCAGTGCT  19
             |||||||||||||||
Sbjct  5584  GGACCTGCCAGTGCT  5598
```

>gi|142386366|ref|NM_138392.2| UniGene Homo sapiens SH3KBP1 binding protein 1 (SHKBP1)
Length=2357

GENE ID: 92799 SHKBP1 | SH3KBP1 binding protein 1 [Homo sapiens]
(10 or fewer PubMed links)

Score = 30.2 bits (15), Expect = 19
Identities = 15/15 (100%), Gaps = 0/15 (0%)

```
Strand=Plus/Minus

Query  5    GGACCTGCCAGTGCCT  20
            ||||||||||||||||
Sbjct  980  GGACCTGCCAGTGCCT  966
```

USSN 10/738,413

EXHIBIT 5